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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application No.: 09/615,233
Applicants: Ichiro KASAI, Yasushi TANIJIRI and Hideki NAGATA
For: HEAD-MOUNTED IMAGE DISPLAY APPARATUS
Confirmation No.: 4352
Customer No.: 24367
Docket No.: 15162/02080
Filed: July 13, 2000
Group Art Unit: 2673
Examiner: David Lee Lewis

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MS APPEAL BRIEF - PATENTS

Commissioner for Patents
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Alexandria, VA 22313

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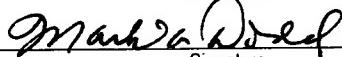
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June 24, 2004

Date of Deposit

Mark A. Dodd

Name of Applicant, Assignee, or Registered Representative



Signature

June 24, 2004

Date of Signature

BRIEF ON APPEAL

This Brief is submitted in triplicate.

Real Party in Interest

The real party in interest in the present Application is Minolta Co., Ltd.

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In Reply to Office Action Dated November 4, 2003

Related Appeals and Interferences

There are no related appeals or declared interferences that will directly affect or be directly affected by the present Application to the knowledge of the undersigned.

Status of Claims

Claims 1 and 3-13 are the subject of this Appeal. No other claims are pending.

Status of Amendments

No amendments were made to the Application by Appellants in response to the Office Action of November 4, 2003.

Summary of Invention

An embodiment of a head-mounted image display apparatus according to the present invention is shown in FIG. 2. The head-mounted image display apparatus includes a projection unit 5 for generating an image that is subsequently projected onto a diffuse-reflective screen 6. The projected image reflects off the screen and is directed toward a half mirror 1. The half mirror then directs the image to the user's pupils EP. The above elements are joined to a head-mounted member 7 that is worn by the user. The apparatus in various embodiments may include an eyepiece optical system 10 as seen in FIG. 4, or an optical element 11 as seen in FIG. 5. By using two projection units, three-dimensional images can be obtained as seen in FIG. 6.

More specifically, the first embodiment, as illustrated in FIGs. 1 and 2, is described beginning on page 5, line 19 and ending on page 7, line 19. Of special significance is the fact that the projection unit 5 forms an actual or real image on the diffuse-reflective screen 6. This is clear as the ray lines from the projection unit 5 come to points on the diffuse-reflective screen 6, i.e., the image is focussed on the diffuse-

reflective screen. This is in contrast to the ray lines on the half mirror 1 which are not points, thus indicating that a real image is not formed on the half mirror 1.

FIG. 4 illustrates the second embodiment of the invention and includes the addition of an eyepiece optical system 10, *see page 8, lines 7-16*. The eyepiece optical system 10 permits a wide viewing angle and permits diopter correction for a user with less than perfect vision.

FIG. 5 illustrates the third embodiment, which builds upon the second embodiment by adding an optical element 11, *see page 8, line 18-28*. The optical element 11 counteracts the effect of the eyepiece optical system 10 such that external objects appear their natural size when viewed through the half mirror 1. Without the optical element 11, external objects would appear enlarged or reduced due to the optical power of the eyepiece optical system 10.

FIG. 6 illustrates the fourth embodiment, which includes a pair of projection units 5R and 5L. By incorporating a pair of projection units, three-dimensional images can be displayed, *see page 9, lines 2-14*.

Issues

The issues are 1) whether claims 1, 3, and 7-11 (and 12, *see below*) are patentable under 35 U.S.C. § 102(b) over U.S. Patent No. 5,601,352 to Okamura (“Okamura”); 2) whether claims 4-6 are patentable under 35 U.S.C. § 103(a) over Okamura in view of U.S. Patent No. 6,185,045 B1 to Hanano (“Hanano”); and 3) whether claim 13 is patentable under 35 U.S.C. § 103(a) over Okamura in view of Hanano, further in view of U.S. Patent No. 6,150,998 to Travers et al. (“Travers”) and U.S. Patent No. 5,537,092 to Suzuki et al. (“Suzuki”). It should be noted that claim 12 is not mentioned in paragraph 2 of the November 4, 2003 Office Action, where claims 1, 3, and 7-11 are rejected. However, claim 12 appears to be rejected in paragraph 4 as being anticipated by Okamura. For this reason, claim 12 will be addressed as part of issue 1.

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Grouping of Claims

In order to make the appeal process as efficient as possible and for the purpose of this Appeal only, Appellants agree to have all of the claims within an issue be considered in a single group. This results in a total of three groups due to the three issues.

Arguments

ISSUE ONE - Whether claims 1, 3, and 7-12 are patentable under 35 U.S.C. § 102(b) over Okamura.

Claims 1, 3, and 7-12 include independent claims 1 and 11, wherein claims 3 and 7-10 depend, directly or indirectly, from claim 1, while claim 12 depends from claim 11.

With respect to claim 1, this claim recites:

A head-mounted image display apparatus comprising:
an image display element;
a projection optical system that projects an image displayed by said image display element;
a screen on which the image projected by said projection optical system is formed; and
a combiner disposed between said projection optical system and said screen,
wherein said combiner transmits image light from said projection optical system and directs it to said screen, and reflects the image light reflected at the screen while simultaneously transmitting external light.

(Emphasis added). Thus, according to claim 1 an image from the image display element is projected by a projection optical system onto a screen such that the same image is formed on a screen. Note that it is “the image” that is formed on the screen, not a modified version thereof due to the antecedent basis use of the term “the.” Both the Final Office Action and the Advisory Action allege that Okamura teaches this aspect of claim 1 by disclosing a diffusing plate 6 in FIG. 4 as a projection optical system, a reflecting ocular lens 7 as a screen, and that an image is formed on the reflecting ocular lens 7 in order to

facilitate the reflection of the image. However, this allegation is respectfully traversed for at least two reasons.

First, the diffusing plate 6 of Okamura is not a “projecting” element. As seen in FIG. 1, the diffusing plate 6 diffuses the light, scattering it in many directions. This is in agreement with the definition of “diffuse transmission” as the “process by which the incident flux passing through a surface or medium is scattered.” THE NEW IEEE STANDARD DICTIONARY OF ELECTRICAL AND ELECTRONICS TERMS 348 (Fifth Ed. 1993). Because the diffusing plate 6 scatters light, it cannot be said to project an image, as any image transmitted therethrough will be scattered.

Second, because the diffusing plate 6 scatters the light transmitted therethrough, the diffusing plate 6 cannot form the image on the ocular lens 7. This is clear in FIG 1 of Okamura in which the light scattered by a single point on the diffusing plate 6 is illustrated as striking the ocular lens 7 in a plurality of locations. Light from a single point in an image plane that strikes a subsequent surface at a plurality of locations is not the same image. Thus, the image projected by Okamura’s image display element (LCDs 3-5) cannot be formed on the ocular lens 7.

Claim 1 requires a projection optical system to project an image displayed by an image display element onto a screen such that the same image is formed on a screen. Okamura fails to disclose a projection optical system that projects an image displayed by an image display element onto a screen such that the same image is formed on the screen for at least two reasons. Because Okamura fails to disclose each element of claim 1, Okamura cannot anticipate claim 1.

Further, Okamura uses the diffusing plate 6 so that a bright image, not a “very thin luminous” image is observed by the user. Okamura, column 5, lines 9-13. In addition, the diffusing plate solves the problem of requiring a focusing shift by the user between the various LCDs 3-5, *see* column 5, lines 15-18, thereby reducing eye fatigue. Thus, Okamura would teach away from changing the diffusing plate 6 to an optical projection

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system as required by claim 1 for at least two reasons. Therefore, Okamura cannot even render obvious the apparatus of claim 1.

Because claims 3 and 7-10 depend, either directly or indirectly, from unanticipated and nonobvious claim 1, claims 3 and 7-10 are likewise unanticipated and nonobvious for at least the same reasons.

With respect to claim 11, this claim recites:

A head-mounted image display apparatus comprising:
an image display element;
a projection optical system that projects an image displayed by said image display element;
a screen on which the image projected by said projection optical system is formed; and
a combiner that reflects image light reflected at said screen, and simultaneously transmits external light.

(Emphasis added). Thus, like claim 1, claim 11 recites that the image displayed by the image display element be projected by the projection optical system onto the screen such that the same, original image is formed on the screen. Therefore, it is respectfully asserted that claim 11 patentably distinguishes over Okamura for at least the same reasons discussed above in connection with claim 1. As claim 12 depends from patentable claim 11, claim 12 is respectfully asserted to be patentable over Okamura for at least the same reasons as claim 11.

Accordingly, it is respectfully requested that the rejection of claims 1, 3, and 7-12 under 35 U.S.C. § 102(b) over Okamura be reconsidered and withdrawn.

ISSUE TWO - Whether claims 4-6 are patentable under 35 U.S.C. § 103(a) over Okamura in view of Hanano.

Claims 4-6 depend from unanticipated and nonobvious claim 1. Therefore claims 4-6 are unanticipated and nonobvious over Okamura. The combination of Okamura and

Hanano similarly fails to disclose or suggest each element of claim 1, and thus claims 4-6 that depend from claim 1.

While example 1 of Hanano, as illustrated in FIG. 1(b), includes a projection lens 5' (which may or may not correspond to a projection optical system), such a projection lens 5' cannot be combined with Okamura for the reasons stated above. Okamura uses the diffusing plate 6 for two reasons: a brighter image and no focussing shift by the user. Therefore, because there is no suggestion to replace Okamura's diffusing plate 6 with Hanano's projection lens 5', the combination does not disclose or suggest each element of claim 1. Thus, the combination of Okamura and Hanano cannot render obvious claim 1, or claims 4-6 that depend therefrom.

Furthermore, the limitation of claim 6 is neither disclosed nor suggested by the combination of Okamura and Hanano. Hanano includes a trapezoidal optical element 13, which may or may not correspond to an eyepiece optical system. However, there is no disclosure or suggestion that the composite optical power of the trapezoidal optical element 13 of Hanano and the shutter 16 of Okamura is substantially zero. In fact, just the opposite is true. Hanano's trapezoidal optical element 13 is stated to be formed "thereby allowing the refracting power to increase at a peripheral portion of the optical element 13," Hanano, column 31, lines 24, 25. In other words, Hanano's trapezoidal optical element 13 has optical power. To satisfy claim 6, Okamura's shutter 16 would have to substantially counteract the power of Hanano's trapezoidal optical element 13. However, Okamura discloses that shutter 16 "can be a mechanical shutter capable of opening and closing mechanically, or it can be a liquid crystal shutter capable of operating by ON and OFF of the power source," Okamura column 6, lines 57-60. Because neither a mechanical shutter nor a liquid crystal shutter has optical power, the optical power of Hanano's trapezoidal optical element 13 is not counteracted. The net result is that the combination of Hanano's trapezoidal optical element 13 and Okamura's shutter 16 will not have a composite optical power of substantially zero. Because the combination of Okamura and Hanano does not

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disclose a limitation of claim 6, the combination of Okamura and Hanano cannot render obvious the invention of claim 6 for at least this additional reason.

Accordingly, it is respectfully requested that the rejection of claims 4-6 under 35 U.S.C. § 103(a) over Okamura in view of Hanano be reconsidered and withdrawn.

ISSUE THREE - Whether claim 13 is patentable under 35 U.S.C. § 103(a) over Okamura in view of Hanano, further in view of Travers and Suzuki.

With respect to claim 13, this claim recites:

A head-piece adapted to be worn on a head of a wearer, the head of the wearer having a face, the head-piece comprising:

a hood, said hood adapted to be positioned on the head of the wearer;

a visor having a first end and a second end, said first end of said visor rotatably mounted to said hood such that said visor rotates from a first position, substantially covering the face of the wearer, to a second position not substantially covering the face of the wearer;

an image display apparatus comprising:

an image display element;

a projection optical system that projects an image displayed by said image display element;

a screen on which the image projected by said projection optical system is formed;

a combiner that reflects image light reflected at said screen, and transmits external light;

an eyepiece optical system disposed between said combiner and the wearer,

wherein said eyepiece optical system enlarges the image projected onto said screen; and

an optical element disposed on an external side of said combiner with respect to said eyepiece optical system,

wherein a composite optical power of said eyepiece optical system and said optical element is substantially zero, and

wherein said image display apparatus is positioned substantially at said second end of said visor.

(Emphasis added). Therefore, claim 13 includes the limitations of a projection optical system and a screen like claim 1. As shown above, the combination of Okamura and Hanano fails to disclose or suggest these limitations as found in claim 1, and thus fails to disclose or suggest these same limitations in claim 13. Also as shown above, the combination of Okamura and Hanano fails to disclose or suggest a composite optical power of substantially zero between an eyepiece optical system and an optical element. Accordingly, claim 13 is respectfully asserted to be nonobvious over the combination of Okamura and Hanano.

The addition of Travers and Suzuki to the combination of Okamura and Hanano similarly fails to disclose or suggest each limitation of claim 13. Travers discloses the use of a visual display 140 of LCDs and projections. *See* Travers, column 4, lines 14, 15. Such a system is a direct view system and therefore would not include a projection optical and a screen as required of claim 13. Further, Travers does not disclose or suggest a composite optical power of substantially zero as no eyepiece optical system is disclosed. Therefore the combination of Okamura, Hanano, and Travers does not disclose or suggest each limitation of claim 13 and cannot render the invention of claim 13 obvious.

Turning finally to Suzuki, Suzuki does not disclose or suggest a projection optical system and a screen or a composite optical power of substantially zero. Suzuki discloses the use of an image display unit in the form of LEDs 3a. *See* Suzuki, column 2, lines 48-50. The light from the LEDs 3a is then reflected by a reflecting surface 4a. *See* Suzuki, column 2, line 67 through column 3, line 2. Thus, Suzuki does not disclose the use of a projection optical system that projects an image displayed by the image display element, a limitation of claim 13. Without an eyepiece optical system, Suzuki does not disclose or suggest a composite optical power of substantially zero, an additional limitation of claim 13.

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In summary, Okamura does not disclose a projection optical system capable of projecting an image from an image display element such that it forms the same image on a screen. While Hanano appears to disclose a projection optical system, Okamura teaches away from replacing its diffusing plate as the diffusing plate leads to a brighter image and less shifting of focus by the user. In addition, neither Travers nor Suzuki even disclose or suggest any type of projection optical system. Lastly, the limitation of a composite optical power of an eyepiece optical system and an optical element being substantially zero is not disclosed or suggested by the combination of Okamura, Hanano, Travers, and Suzuki. Therefore, the combination of Okamura, Hanano, Travers, and Suzuki does not disclose or suggest each limitation of claim 13, and thus cannot render obvious the invention of claim 13.

Accordingly, it is respectfully requested that the rejection of claim 13 under 35 U.S.C. § 103(a) over Okamura in view of Hanano, further in view of Travers and Suzuki, be reconsidered and withdrawn.

Conclusion

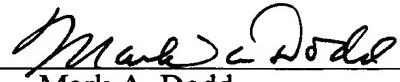
In view of the foregoing, a *prima facie* case of obviousness has not been established with regard to claims 1 and 3-13. Accordingly, Appellants respectfully request the Board of Patent Appeals and Interferences to reverse the Examiner's rejections as to all of the appealed claims.

This brief is accompanied by a Response Transmittal and Fee Authorization, authorizing the requisite fee of \$330.00 as set forth in § 1.17(c). In the event that the Response Transmittal and Fee Authorization is not enclosed, please charge any required fee (other than an issue fee) during the pendency of this Application to Sidley Austin

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Brown & Wood LLP's Deposit Account No. 18-1260. Please credit any excess payment to the same account.

Respectfully submitted,

By: 
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June 24, 2004

APPENDIX

1. (Previously Presented) A head-mounted image display apparatus comprising:
 - an image display element;
 - a projection optical system that projects an image displayed by said image display element;
 - a screen on which the image projected by said projection optical system is formed; and
 - a combiner disposed between said projection optical system and said screen, wherein said combiner transmits image light from said projection optical system and directs it to said screen, and reflects the image light reflected at the screen while simultaneously transmitting external light.
2. (Cancelled).
3. (Original) A head-mounted image display apparatus as claimed in claim 1, wherein said screen is disposed above or below a user's pupil.
4. (Original) A head-mounted image display apparatus as claimed in claim 1, further comprising an eyepiece optical system disposed between said combiner and the user,
wherein said eyepiece optical system enlarges the image projected onto said screen.
5. (Original) A head-mounted image display apparatus as claimed in claim 4, further comprising an optical element disposed on an external side of said combiner with respect to said eyepiece optical system.

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6. (Original) A head-mounted image display apparatus as claimed in claim 5, wherein a composite optical power of said eyepiece optical system and said optical element is substantially zero.
7. (Original) A head-mounted image display apparatus as claimed in claim 1, wherein said image display apparatus has a plurality of units each including said image display element and said projection optical system.
8. (Original) A head-mounted image display apparatus as claimed in claim 7, wherein said units form images corresponding to the user's left and right pupils.
9. (Original) A head-mounted image display apparatus as claimed in claim 1, wherein said screen has a retroreflection characteristic.
10. (Original) A head-mounted image display apparatus as claimed in claim 1, wherein said combiner is a half mirror or a polarization separation member.
11. (Previously Presented) A head-mounted image display apparatus comprising:
 - an image display element;
 - a projection optical system that projects an image displayed by said image display element;
 - a screen on which the image projected by said projection optical system is formed; and
 - a combiner that reflects image light reflected at said screen, and simultaneously transmits external light.
12. (Original) A head-mounted image display apparatus as claimed in claim 11, wherein said combiner further transmits image light from said projection optical system and directs it to said screen.

13. (Previously Presented) A head-piece adapted to be worn on a head of a wearer, the head of the wearer having a face, the head-piece comprising:

a hood, said hood adapted to be positioned on the head of the wearer;

a visor having a first end and a second end, said first end of said visor rotatably mounted to said hood such that said visor rotates from a first position, substantially covering the face of the wearer, to a second position not substantially covering the face of the wearer;

an image display apparatus comprising:

an image display element;

a projection optical system that projects an image displayed by said image display element;

a screen on which the image projected by said projection optical system is formed;

a combiner that reflects image light reflected at said screen, and transmits external light;

an eyepiece optical system disposed between said combiner and the wearer,

wherein said eyepiece optical system enlarges the image projected onto said screen; and

an optical element disposed on an external side of said combiner with respect to said eyepiece optical system,

wherein a composite optical power of said eyepiece optical system and said optical element is substantially zero, and

wherein said image display apparatus is positioned substantially at said second end of said visor.



RESPONSE TRANSMITTAL AND FEE AUTHORIZATION

AF/ #
2673

		ATTORNEY DOCKET NO.:15162/02080		APPLICATION No.: 09/615,233	
FILING DATE: July 13, 2000	CONFIRMATION NO.: 4352	CUSTOMER NO. 24367	EXAMINER: David Lee Lewis	GROUP ART UNIT 2673	
INVENTOR(S): Ichiro KASAI, Yasushi TANIJIRI and Hideki NAGATA					
TITLE OF INVENTION: HEAD-MOUNTED IMAGE DISPLAY APPARATUS					

MS APPEAL BRIEF - PATENTS

Commissioner For Patents
P.O. Box 1450
Alexandria, VA 22313-1450

TRANSMITTED HEREWITH FOR THE ABOVE IDENTIFIED
PATENT APPLICATION IS:

- (A) A response to the final Office Action dated: November 4, 2003
- (B) A Petition for Extension of Time
 - for 1 month for 2 months for 3 months;
 - A Petition for Extension of Time, having been previously filed,
 - for 1 month for 2 months for 3 months
- (C) A Notice of Appeal. \$
- (D) An Appellant's Brief on Appeal. \$330.00
- (E) Other: . \$
- (F) A verified statement to establish small entity status under 37 CFR §§ 1.9 and 1.27
 - Small entity status under 37 CFR § 1.27 has been previously established
 - The claims fee, if any, has been calculated as shown below

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June 24, 2004	
Date of Deposit	
Mark A. Dodd	
Name of Applicant, Assignee, or Registered Representative	
Signature	
June 24, 2004	
Date of Signature	

	CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NO. PREVIOUSLY PAID FOR /	PRESENT EXTRA
TOTAL		MINUS		
INDEP.		MINUS		

FIRST PRESENTATION OF MULTIPLE DEP. CLAIM

SMALL ENTITY	
RATE	ADD'L FEE
x \$9	\$
x \$43	
+ \$145	
TOTAL ADD'L FEE	\$ 0.00

LARGE ENTITY	
RATE	ADD'L FEE
x \$18	\$
x \$86	
+ \$290	
TOTAL ADD'L FEE	\$ 0.00

OR

- Please charge \$330.00 to Sidley Austin Brown & Wood LLP's Deposit Account No. 18-1260, which includes
 - the amount of \$ for the claims fee calculated above AND/OR
 - the amount of \$330.00 for the fee for item(s) (B) (C) (D) (E) (F)
- Please charge any additional fees (other than issue fee) required during the pendency of this application to Deposit Account No. 18-1260. Please credit any overpayment to Deposit Account No. 18-1260.
- A duplicate copy of this Response Transmittal and Fee Authorization is enclosed.

June 24, 2004
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